REMARKS

Claims 1-9 are currently pending in the application. By this amendment, claims 1, 2 and 4 have been amended, and new claims 7-9 have been added. The foregoing separate sheets marked as "Listing of Claims" shows all the claims in the application, with an indication of the current status of each.

Claim Rejections

35 USC §102(e) Rejection

Claims 1, 3, and 5 stand rejected under 35 USC §102(e) as anticipated by Howell. This rejection is traversed.

The present invention provides a connector body having a top, a bottom, and an inner side face between the top and bottom. The inner side face defines a chamber with an opening in the top through which a module body can be inserted into the chamber (page 6, lines 7-13). Along each side wall of the connector are located 1) conducting terminals (formed at the end of contact pins, see page 6, lines 24-25, which are provided on the inner side wall, see page 6, lines 11-13) and 2) a ground terminal (page 6, lines 14-15). The conducting and ground terminals are arranged such that the ground terminal is located closer to the outer edge of the opening through which the module is inserted than are the conducting terminals (page 7, lines 6-7, Figure 2D and Figure 3). Because of this arrangement, as a module is being inserted into the chamber, contact pads of the module encounter the ground terminal before encountering the conducting terminals (page 7, lines 8-14). As a result, static charge is released before the conducting terminals of the connector body are engaged with contact pads of the module body (page 7, lines 13-14). This arrangement thus protects the module elements from harm that can be caused by static electricity (page 7, lines 14-15).

A second feature of the connector body is that the conducting terminals and the ground terminals are both located on the same inner side surface, i.e. each inner side surface contains both conducting terminals and ground terminals (see page 6, lines 11-13 and 14-15, and Figure 2A).

In addition, in the present invention the elements of the module (contact pads) that contact the ground terminals and the conductive terminals and of the connector are one and the same. Since the ground terminals are located nearer to the outer opening of the chamber into which the module is inserted than is the conductive terminal, as the module in inserted, the contact pads of the module encounter ground terminals first, static electricity is discharged, and then as the module is inserted further into the chamber, the contact pads travel past the ground terminals, lose electrical contact with the ground terminals, and contact the conductive terminals of the connector, which are located closer to the bottom of the chamber. The ground terminals are then no longer in contact with the contact pads of the module but are accommodated in recesses provided on the module. In other words, contact with the ground terminals is transient, one time event. This feature of the invention is now recited in amended claims 1, 2 and 4, which recite that the second (ground) terminal is located closer to the opening than the first terminal, so that the conductive member of the module body is not in contact with the second (ground) terminal when the module body is plenarily accommodated (fully inserted) into the chamber. Support for this feature of the invention is provided in the specification on page 7 at lines 8-22, where contact between the contact pads of the module and the ground during insertion, followed by further insertion of the module to bring the contact pads into contact with the contact pins of the connector, is described. Upon full insertion, the ground terminal is engaged in a recess 22a provided for that purpose and depicted clearly in Figure 1C. As can be seen from Figure 1C, it would not be possible for the ground to maintain contact with the contact pads 24 of the module and be engaged in recess 22a at the same time. Upon full insertion of the module into the chamber, contact between the ground and the contact pads is broken and the ground terminal engages the recess, helping to hold the module in the chamber.

In contrast, the invention of Howell shows a high current capacity socket with side contacts shown as 20a in Figures 5, 6and 7, and ground contacts shown as 20b in Figures 5, 6 and 7. As can be seen from the figures, the ground contact may be on the same side of the socket (Figures 5 and 7), and may be arranged so that the ground contacts are higher than the side contacts and thus are encountered first by an integrated circuit package that is being inserted into the receiving room 104 of the socket. However, the mechanism of contact between the electrical

connections of the inserted IC package and the contacts of the socket is unlike the mechanism of contact employed in the present invention. In the present invention, the contact pads of the inserted module first contact the ground terminal, and then disengage from the ground terminal as the module is inserted further into the chamber. Once the module is fully inserted into the chamber, the contact pads of the module are in contact only with the electrical terminals, and the ground terminals are unused. The purpose of the ground terminals of the present invention is to discharge static electricity, not to provide grounding while the module is "plugged in" (electrically connected) to the connector. In contrast, the ground contacts of Howell are placed in such a manner as to remain in continual contact with the elements of the IC package which they contact as long as the IC package is "plugged in" and provide a ground function during that time. Thus, the design of the connector and module of the present invention is fundamentally different from that of the socket for receiving an IC package as described by Howell.

35 USC §102(b) Rejection

Claims 1, 3, and 4 stand rejected under 35 USC 102(b) as anticipated by Perkins et al. (hereafter "Perkins") This rejection is traversed.

Perkins discloses a card grounding apparatus. In the system described by Perkins, a memory card is inserted into a slot of an electronic device in a manner that discharges any static electricity charge on the card prior to mating of the card and device contacts. The card has a frame with opposite sides that have metal clips, and the electronic device has grounding terminals that engage the clips as the card is inserted. This is illustrated in Figure 2, where a pair of grounding terminals, 74 and 76, located on opposite sides of the slot are illustrated. Grounds 74 and 76 are connected to a ground plane of the electronic device. Upon insertion of the card into the slot, highly conductive regions 70 and 72 (see Figure 4) of the card wipe against grounds 74 and 76 of the slot before the multiple socket contacts 32 of connector 30 of the card (Figure 3) contact and mate with the corresponding pin contacts 34 of the slot in the electronic device (Figure 2). Thus, static electricity from the card that is being inserted is dissipated during insertion of the card, and before the card is electronically connected to the electronic device, preventing potentially damaging sparks due to the static electricity. A discussion of insertion of the card and discharge of the static electricity is given in column 3 at lines 24-37.

Thus, the grounding terminals on the slot of Perkins are located on opposing sides of the slot, and the pin contacts of the slot are located at a different side of the slot, i.e. at the "front end" 36 (column 2, lines 50-53, and Figure 2), which is the "bottom" of the slot when looking into the slot in the direction of card insertion. Further, the elements used in grounding are distinct from those used to form the electrical connection. The grounding elements are merely highly conductive regions of the card whereas the electrical connection utilizes multiple socket contacts and pin contacts.

The slot designed by Perkins must have this design, since it is tailor-made to accommodate a rectangular-shaped card with

1) connecting pins at the "forward end" of the card (e.g. column 2, lines 48-50); this is the end of the card that is inserted first, and that will contact the front end or "bottom" of the slot to ultimately provide an electrical connection with the device; and

2) conductive regions placed along the two opposing sides of the card which contact the sides of the slot during insertion for the purpose of providing a ground.

In contrast, in the present invention, a connector (analogous to the slot of Perkins) for receiving a module body (e.g. a camera module, analogous to the card of Perkins) is provided. The connector possesses conductive terminals (contacts) located along the inner side face of the connector, rather than at the front end, as is the case for Perkins slot. The conductive terminals make electrical contact with corresponding conductive members located on the outer periphery of the module body, rather than at the forward end of the module as is the case with the Perkins card, when it is inserted into the connector. This is in contrast to the system described by Perkins, where the electrical contacts are placed at the front end of the slot and the forward end of the card.

Thus, in the present invention, the grounds are located on the same side (face) of the connector as the conductive terminals, whereas Perkins locates the grounds on opposing sides of the card and slot. In addition, in the present invention, the conductive member of the module that contacts the ground of the connector is the same as that which ultimately engages with a conductive terminal of the connector to establish a working electrical connection. Contact between the conductive member and the ground happens first, static discharge occurs, and then

the conductive member is moved further into the module and into contact with the conductive terminal. Thus, the design and operation of the connector and module body of the present invention are distinct from those presented by Perkins.

In view of the foregoing, Applicant respectfully requests withdrawal of this rejection.

35 USC §103(a) Rejection

1. Claim 2 stands rejected under 35 USC 103(a) an unpatentable over Howell et al. in view of Grabbe et al. This rejection is traversed.

As described above, the invention of Howell et al. does not anticipate the present invention. For example, Howell et al. describe a socket in which ground contacts are maintained after insertion of an IC package into the socket, whereas in the present invention, contacts with the ground terminals are transient, occurring during insertion of the module in order to discharge static electricity. However, Howell et al. do not show or discuss a mechanism for transient ground contact, in which such contact occurs during insertion of the module but is not maintained once the module is fully inserted.

Grabbe et al. disclose chambers with rectangular cross sections with terminals provided on each of four inner side faces of the chamber. However, Grabbe et al. neither show or discuss a feature that provides for transient contact between contact pads of an inserted module and ground connections, the contact occurring during insertion of the module but not once the module is fully inserted. Since neither Howell et al. or Grabbe et al. show or discuss this feature, the present invention cannot be rendered obvious by any combination of these two references.

Claim 6 stands rejected under 35 USC 103(a) an unpatentable over Howell et al. in view of the admitted prior art. This rejection is traversed.

Howell et al. describes a socket for receipt of an IC package as described above. However, Howell et al. does not show or suggest a transient grounding mechanism to discharge static electricity during insertion of a module, but that is not maintained once the module is fully inserted into a connector. The "admitted prior art" teaches only that the module that is inserted may be a camera, but does not show or suggest that the camera module could be inserted into a connector equipped to effect the discharge of static electricity to a ground during insertion of the camera module, without maintaining contact to the ground once fully inserted, as taught by the

present invention. Thus, no combination of Howell et al. and the admitted prior art renders the present invention obvious.

In view of the foregoing, Applicant respectfully requests withdrawal of this rejection.

New Claims

New dependent claims 7, 8 and 9 have been added to the application. New dependent claims 7 and 8 depend on claims 1 and 4, respectively, and recite the feature that the second terminal is formed with a projection which engages with recesses formed on the module body. The result is that the module body is retained against withdrawal when it is fully accommodated in the chamber. Similarly, new claim 9 depends from claim 4 and recites that the protrusion is engaged with recesses formed on the module body so the module body is retained against withdrawal. Support for this feature is found in the specification, for example, on page 4 at lines 15-19 and page 7, lines 18-21.

Formal Matters and Conclusion

In view of the foregoing, it is requested that the application be reconsidered, that claims 1-9 be allowed, and that the application be passed to issue.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at 703-787-9400 (fax: 703-787-7557; email: ruth@wcc-ip.com) to discuss any other changes deemed necessary in a telephonic or personal interview.

If an extension of time is required for this response to be considered as being timely filed, a conditional petition is hereby made for such extension of time. Please charge any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-2041.

Respectfully submitted,

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